

**PSG COLLEGE OF TECHNOLOGY, COIMBATORE - 641 004**

**Department of Computer Science and Engineering**

**BE CSE & SEMESTER V**

### **CONTINUOUS ASSESSMENT TEST I Date: 08.08.2024**

**19Z502 - MICROPROCESSORS AND INTERFACING**

### **Time: 1 Hour 30 minutes. Maximum Marks: 50**

| **INSTRUCTIONS:** |
| --- |
| 1. Answer **ALL** questions. Each Question carries 25 Marks. 2. In each question, subdivision **a** carries total of 5 marks (one mark for each question), subdivisions **b(i)** and **b(ii)** carries 5 marks each and subdivision **c** carries 10 marks each. 3. Course Outcome Table: |

1. **a (5 x 1 mark = 5 marks)**
2. In 8086 microprocessor, for a PUSH instruction after each execution of the instruction, the stack pointer is
3. Incremented by 1 B) Decrement by 1
4. Incremented by 2 D) Decremented by 2
5. Identify the instructions with correct syntax
6. MOV DS,1000
7. NEG BL
8. CBW BL
9. SHR BX, CL
10. II and IV only B) II only C) I and II only D) I, II and III only
11. The size of each segment in 8086 is
12. 64KB B) 24KB C) 128 KB D) 256 KB
13. Given an number 9AH (in hexadecimal format). Show how it’s represented in Unpacked BCD and packed BCD format. Show the output in binary form.

F) The program that follows implements a delay loop.

MOV CX, 0280H

DLY: DEC CX

JNZ DLY

NXT: …

How many times (in decimal) does the JNZ DLY instruction jumps to DLY label?

**(2 x 5 marks = 10 marks)**

**b.**

i. Sketch the software architecture of 8086 processor and explain its register organization.

ii. List the types addressing modes available in 8086. Explain the various memory operand addressing modes of 8086 with appropriate example.

1. **x 10 marks = 10 marks)**

**c**. An array of 16-bit numbers is saved in memory location starting from 2000. The size of the array (16-bit number) is stored in location 2500 and 2501. There will be exactly one element repeated in the array.Write an assembly language program to **f**ind the repeated element in the array and save it (16-bit number) in location 2502 and 2503.

**For Example:**

**Input: Output:**

| **Memory location** | **Values (HEX)** | **Value in Decimal** |  | **Memory location** | **Values (HEX)** | **Value in Decimal** |
| --- | --- | --- | --- | --- | --- | --- |
| 2000 | 06 | 6 |  | 2502 | 00 | 257 |
| 2001 | 00 |  | 2503 | 01 |
| 2002 | 00 | 0 |  |  |  |  |
| 2003 | 00 |  |  |  |
| 2004 | 01 | 257 |  |  |  |  |
| 2005 | 00 |  |  |  |  |
| 2006 | 00 | 257 |  |  |  |  |
| 2007 | 01 |  |  |  |  |
| **Memory location** | **Values (HEX)** | **Value in Decimal** |  |  |  |  |
| 2500 | 06 | 4 |  |  |  |  |
| 2501 | 00 |  |  |  |  |

1. **a.  (5 x 1 mark = 5 marks)**

i. Identify the output signal/s of 8086 from the following

A)  B) HLDA C) READY D) INTR

ii. Pick the TRUE statement/s from the following.

I. Switching RESET to logic 0 initializes the internal registers of the MPU.

II. LOCK' is an input signal which is used to lock out processor from using the bus.

III. NMI is the interrupt request with highest priority and cannot be masked by software.

1. I only B) II and III only C) I and III only D) I and II only

iii. What does status code S4S3 = 01 mean in terms of memory segment being accessed by microprocessor?

1. Extra Segment B) Code Segment C) Data Segment D) Stack Segment

iv. How many minimum and maximum number of idle states that can be inserted in a 8086 microprocessor ?

v. What is the duration of the bus cycle in the 8088 microprocessor if the clock is 5 MHz and three wait states are inserted ?

**b. (2 x 5 marks = 10 marks)**

i. Compare 8088 and 8086 microprocessor for maximum and minimum mode of operation.

ii. Demonstrate with a diagram on how a misaligned word is transferred from memory to 8086 processor, using the concept of memory bank. Identify all the signals involved in this process ?

**(1 x 10 marks = 10 marks)**

**c.** Consider a byte 4516 is written to memory address 0A00D16 of an 8086 based microcomputer operating in minimum mode. What type of bus cycle does the processor uses for this interaction? Illustrate that with a timing diagram.

Answer key:

1. a. 1. D
2. a. 2. A
3. a. 3. A
4. a. 4. Incorrect Question: BCD is used only for numbers 0 to 9. Unpacked BCD (as 16 bits) and packed BCD (as 8 bits)
5. a. 5. 0280H is 640 in decimal…however, when CX is 0, jump will not be executed, so 639 times

2.a.1. A and B

2.a.2. C ( I and III only)

2.a.3. D (Stack Segment)

2.a.4. Idle states can’t be inserted in a read/write bus cycle. Only wait states can be inserted. Max. idles states - no limit, as long as READY signal is active low, the idle states are inserted.

2.a.5. 200ns \* (4 +3) = 1400ns